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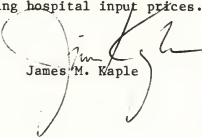
From Acting Director
Bureau of Data Management and Strategy

Subject Hospital Input Price Indexes: Selected Resources Used in Their
Development

To See Below

Hospital prospective payment programs and proposals at the State and national levels are a major topic of concern in current discussions on hospital cost containment. A key feature of virtually all of these programs is the measurement and projection of prices hospitals pay for resource inputs. The attached paper provides an overview of the background, concepts, and resources used to develop hospital input price indexes and discusses the relationship between these indexes and other hospital cost factors. This paper was prepared by Mark Freeland and Carol Schendler of the Division of National Cost Estimates, Office of Financial and Actuarial Analysis. It will be included as an appendix to the congressionally mandated study of prospective payment programs.

I thought you might find this paper useful since much of the current discussion on hospital cost containment has, in one form or another, some requirement for measuring hospital input prices.



James M. Kaple

Attachment

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HOSPITAL INPUT PRICE INDEXES: SELECTED RESOURCES USED IN THEIR DEVELOPMENT
by Mark S. Freeland, Ph.D.
and Carol Ellen Schendler

This paper provides a brief introduction to the concepts and resources used to develop hospital input price indexes for use in prospective payment programs. General issues are presented first followed by a discussion of selected issues pertaining to base year expenditure weights and price indicator variables. A question and answer format is used to introduce some major themes. As a guide to development of indexes this paper is not intended to provide sufficient detail to enable one to develop such indexes without consulting the resource materials and resource organizations.

In formulating any prospective payment system that constrains hospital expenditures, a fundamental objective is to partition growth in expenditures into increases that are "discretionary" and into increases that are beyond the control of the hospital industry (Hughes, et. al., 1978; Rossman, et. al., 1977). "Discretionary" cost increases include growth in the quantity and quality of resources used to treat specific diagnostic categories and perhaps wage and fringe benefit increases for certain groups of hospital employees. Cost increases beyond the control of the hospital industry include price increases for most non-labor resource inputs, wage and fringe benefit increases for certain categories of employees, and variations in costs associated with unanticipated changes in occupancy rates.

Hospital input price indexes are an important but limited tool that assists in the process of partitioning growth in hospital expenditures

into "discretionary" and nondiscretionary increases. Hospital input price indexes provide the weighted average percent increase for prices for a fixed market basket of inputs used to produce hospital care (see Table 1). There are two components of hospital input price indexes: cost share weights and input price change variables associated with each cost share category. The product of the individual price change variables (such as wage rates, food prices, natural gas prices, etc.) with associated cost shares, summed across all expense categories, provides the weighted average or composite percent increase for input prices (see column entitled "weighted inflation factor" in Table 1; also see Wallace and Cullison, 1979).

A hospital input price index provides an approximate answer to the following question: "How much would it cost to continue to provide the exact same quantity and quality of care this year as last year?" The index can be applied to the (1) total hospital budget, (2) expenses per day, (3) expenses per admission, (4) expenses per enrollee, etc.

An input price index does not address other important prospective payment issues such as quantity and quality of inputs, quantity and quality of outputs, volume, productivity, shifts in the mix of inputs and outputs, and the initial baseline level of expenditures (Rossman et. al., 1977). An input price index deals with changes in baseline expenditures due to price changes only for a fixed market basket of inputs. For the period 1969 to 1979 increases in hospital input prices accounted for 59 percent of the total increase in community hospital inpatient expenditures. Increases in admissions accounted for 19 percent of the

Table 1
HCFA Input Price Index for Routine Inpatient Operating Costs, 1980 Percent Changes ^{1/}

Categories of Cost	^{2/} Relative Importance (1979)	^{3/} Inflation Factor (1980)	^{4/} Weighted Inflation Factor (1980)	^{5/6/} Price Variable
Wages and salaries	59.41%	10.6%	6.30	Average hourly earnings of hospital employees (BLS)
Employee benefits	8.13	11.5	.93	Supplements to wages and salaries per worker (BEA and BLS)
Professional fees (legal, auditing, consulting, etc.)	0.49	9.1	.04	Average hourly earnings, total private (BLS)
Malpractice insurance ^{7/}	2.09	10.0	.21	Hospital malpractice insurance premiums per hospital (HCFA)
Food-purchases at later stages of distribution	3.02	8.6	.26	CPI food and beverages
Food-purchases at early stages of distribution	2.97	8.4	.25	CPI foods and feeds
Fuel oil	1.43	15.7	.23	CPI fuel oil and coal (BEA/BLS) ^{8/}
Electricity	0.83	19.3	.16	CPI electricity (BEA/BLS) ^{8/}
Natural gas	0.69	38.0	.26	CPI utility (piped) gas (BEA/BLS) ^{8/}
Water and sewerage	0.38	6.8	.03	CPI water and sewerage maintenance
Drugs	1.32	8.9	.12	PPI pharmaceutical preparations, ethical
Chemicals and cleaning products	2.53	17.1	.43	PPI chemicals and allied products
Surgical and medical instruments	1.25	11.7	.15	PPI special industry machinery and equipment
Rubber and miscellaneous plastics	1.07	11.9	.13	PPI rubber and plastic products
Business travel	1.44	17.8	.26	CPI transportation
Apparel and textiles	1.72	8.8	.15	PPI textile products and apparel
Business services	3.93	15.4	.60	CPI services
All other miscellaneous	7.30	13.5	.99	CPI all items
Total	100.00		11.50	

^{1/} Health Care Financing Administration, "Medicare Program; Schedule of Limits on Hospital Per Diem Inpatient General Routine Operating Costs," Federal Register, September 30, 1981, pp. 48010-48017. This index is for routine operating costs. Ancillary services, capital, etc. are excluded.

^{2/} Derived primarily from American Hospital Association, Department of Health and Human Services, Department of Commerce, and Department of Labor data sources.

^{3/} Percent change for 1980 over 1979.

^{4/} For example, the weighted inflation factor for wages and salaries is calculated as follows: $.5941 \times 10.6 = 6.30$.

^{5/} For more detailed definitions of price variables see Health Care Financing Administration (September 30, 1981) and Freeland, Anderson, and Schendler (1979).

^{7/} The hospital malpractice insurance cost category has now been omitted from the HCFA Input Price Index for Routine Inpatient Operating Costs. Malpractice insurance costs are reimbursed for separately from the input price index.

^{8/} This CPI is used to derive the Bureau of Economic Analysis implicit price deflator for this particular component of energy costs. HCFA uses the implicit price deflator in its input price index.

expenditure growth and growth in intensity of services per admission accounted for the remaining 22 percent (Freeland and Schendler, 1981). Thus input price increases are the major determinant of expenditure increases. In addition, the index permits quantification of the growth in intensity, a key "discretionary" component of hospital cost increases.

General Issues Pertaining to Development of Input Price Indexes

1. Why is a hospital input price index used for an inflation adjustment in prospective payment programs rather than some other measure of inflation such as the Consumer Price Index?

A hospital-specific index is important because hospitals produce their outputs with a mix of labor, energy, and raw materials that differs from other industries. The use of general indexes such as the all items Consumer Price Index (CPI), the CPI hospital room rate, the Producer Price Index (PPI), or the Gross National Product Implicit Price Deflator as proxies for a hospital-specific input price index may overstate or understate the yearly increases in prices of goods and services used by hospitals.

Hospital-specific input price indexes can be designed to impose external efficiency constraints on the hospital industry in a manner that is fair and promotes both financial viability and the production of quality care. In addition it provides maximum freedom for hospital administrators to allocate resources to meet individual hospital circumstances.

When all affected parties are assured that a fair and efficient hospital-specific input price index is used as part of the prospective payment program, the focus of negotiations and bargaining shifts to the fundamental issue of cost control--the rate of increase of the intensity of services provided per patient day or per admission (Feldstein, 1981; Joskow, 1981). Thus the use of a fair and efficient hospital-specific input price index provides the environment to produce a tighter, more effective program of cost containment that is workable for the long-term by all affected parties.

2. How does a hospital input price index fit into the total prospective payment process?

The hospital input price index is one component of an integrated total process. Table 2 provides an example of how input price increases, productivity changes, and increased intensity of services per admission fit together to produce allowable increases in net cost per admission under the proposed phase IV of the Economic Stabilization Program (Altman and Eichenholz, 1974). Cost per admission was allowed to rise due to increases in input prices and increases in intensity of services (e.g., more diagnostic and therapeutic tests) per admission. An offset was made for productivity increases since increased productivity implies that more outputs are produced with the same inputs. Typically, the productivity offset is not an explicit factor in the prospective payment formula. However, it is implicitly taken into account when the policy-determined allowable intensity increase factor is chosen.

Table 2

Controlling Hospital Costs Under Phase IV of the Economic Stabilization Program: Hospital Input Price Index, Productivity Offset, and Allowance for Increased Intensity of Services Per Admission 1/

<u>Cost Per Admission Increase Factors</u>	<u>Percent Changes (Annual)</u>
Increase in Phase IV Hospital Input Price Index	5.9%
Adjustment for increased productivity (Phase IV policy parameter)	-1.0 <u>2/</u>
Allowance for increased intensity of services per admission (Phase IV policy parameter)	2.5 <u>3/</u>
Increase in allowable net cost per admission	<hr/> 7.4

1/ Stuart H. Altman and Joseph Eichenholz, "Control of Hospital Costs Under the Economic Stabilization Program," Federal Register, Vol. 39, No. 16, January 23, 1974, p. 2698.

2/ Assumes productivity rises one percent.

3/ Gross service intensity increase is 2.5 percent. Net service intensity increase is 1.5 percent (2.5 - 1.0 = 1.5).

Other important components of the prospective payment program such as adjustments for volume and case mix are not shown in Table 2.

3. What are some general guidelines?

- a. The index should be developed consistent with the legal institutions of administrative process, judicial review, and contract law specifying rights and responsibilities of affected parties (Hamilton, Walter, and Cromwell, 1980).
- b. All concerned parties should have ready access to definitions, data bases, methods of analysis, forecasts, exception processes, and retroactive correction procedures. Full disclosure is essential for fairness and quality control, and to create the proper environment for cooperatively reaching objectives.
- c. The index should be developed so that it can be clearly explained to all affected parties. Use of complex and esoteric procedures and use of a large number of cost categories and special adjustments to gain alleged precision must be balanced against the loss of understanding by the affected parties.

4. Are there hospital input price indexes that have been used for several years in a prospective payment context that can be studied as prototypes?

Yes. State agencies, Blue Cross plans and hospital associations have used input price indexes as part of their prospective payment programs. Arizona, Connecticut, Maryland, Massachusetts, New York, New Jersey, and Western Pennsylvania among others are locations of programs that have used input price indexes for several years (Hamilton, Walter, and Cromwell, 1980). In addition, the Federal Medicare program uses a hospital input price index as one determinant for setting limits on routine operating costs (Health Care Financing Administration, September 30, 1981). Tables 1, 3, and 4 provide three examples of input price indexes used in prospective payment programs.

5. Should a state agency develop an input index with its own internal staff or should it hire a private consultant?

This depends on available resources, preferences, and time constraints. Private consulting firms that develop input price indexes can be located by contacting associations, agencies, and Blue Cross plans that currently have operational input price indexes.

6. Should adjustments for exceptions be made for an individual hospital when a single price component (e.g., professional fees) increases more for that hospital than for the average hospital in its comparison group?

In general, no. Each hospital typically will have some individual price components which have price increases

Table 3
Maryland Health Services Cost Review Commission Hospital Input Price Index, Categories of Cost and Price Variables 1/

Categories of Cost

Price Variables for Rates of Change 2/

I. Salaries and fringe benefits

Average hourly earnings, service workers (BLS)

II. Food, supplies, utilities, and contracted services

A. Printing, office supplies, copying, postage

Average hourly earnings, total private (BLS) (75%)

B. Medical-surgical supplies

PPI paper (25%)

C. I.V. solutions and sets

CPI non-prescription medical equipment and supplies

D. Pharmacy

Maryland Hospital Association group purchasing contract rates

E. Laundry, linen, uniforms

PPI pharmaceutical preparations, ethical (50%)

F. Chemicals, solutions, lubrications, gases

PPI pharmaceutical preparations, proprietary (50%)

G. X-ray films and solutions

Average hourly earnings, hospital workers (BLS) (75%)

H. Blood and Blood plasma

PPI apparel and other fabricated textile products (25%)

I. Contractual services, professional fees

PPI industrial chemicals

J. Insurance

Maryland Hospital Association group purchasing contract rates

K. Telephone

American Red Cross rates

L. Utilities and water

Average hourly earnings, total private (BLS)

M. Food

CPI insurance and finance

Rate increase granted by the Public Service Commission

PPI fuels & related products and power

CPI food (50%)

PPI processed foods and feeds (50%)

III. Selected components of movable equipment

PPI machines and equipment

1/ Maryland Health Services Cost Review Commission
201 West Preston Street
Baltimore, Maryland 21201
(cost categories and price variables in effect
July 1, 1981)

2/ Acronyms
BLS = Bureau of Labor Statistics, Department of Labor
CPI = Consumer Price Index
PPI = Producer Price Index

Table 4
New Jersey Hospital Association Input Price Index, Categories of Cost, Relative Importance, and Price Variables 1/2/

Categories of Cost	Relative Importance 1979	Price Variables for Rates of Change
I. Labor		
A. Non-physician salaries, physicians' salaries and fees	57.6%	Employment Cost Index for Northeast (BLS)
B. Interns, residents and fellows	1.7	Average stipend for house staff for Northeast, *adjusted
C. Fringe benefits		
1. FICA	3.1	Social Security tax rate and base calculations
2. Workmen's compensation	0.5	Manual rate calculations
3. Unemployment insurance	0.4	Unemployment insurance rate and base calculations
4. Disability insurance	0.2	Disability insurance rate and base calculations
5. Medical insurance	1.5	N. J. Hospital Association Blue Cross/Blue Shield premium rates
6. Life insurance	0.2	N. J. Hospital Association group life insurance premium rate
7. Pensions	0.4	Employment Cost Index for Northeast (BLS)
8. Other policy fringe benefits	1.9	Employment Cost Index for Northeast (BLS)
II. Supplies		
A. Office supplies	1.0	PPI office supplies and accessories (20%)
		PPI paper, unwatermarked, bond, No. 4 (40%)
		PPI paper, form bond 12 lb. (40%)
B. Raw food	2.1	CPI food at home (50%)
		PPI processed food less feed, less alcoholic and non-alcoholic beverages (50%)
C. Other dietary supplies	0.4	PPI household napkins (15%)
		PPI papergoods, hot cups (15%)
		PPI unsupported plastic film and sheeting (7.5%)
		PPI dinnerware (22.5%)
		PPI household flatware, stainless steel (22.5%)
		PPI soap and synthetic detergent (17.5%)
D. Housekeeping supplies	0.2	PPI sanitary paper and health products (30%)
		PPI unsupported plastic film and sheeting (30%)
		PPI soap and synthetic detergent (40%)

Table 4 (Continued)
New Jersey Hospital Association Input Price Index, Categories of Cost Relative Importance, and Price Variables

<u>Categories of Cost</u>	<u>Relative Importance 1979</u>	<u>Price Variables for Rates of Change</u>
E. Laundry and linen supplies	0.3	PPI soap and synthetic detergents (60%) CPI Household linens (40%)
F. Drugs	2.3	PPI drugs and pharmaceuticals less pharmaceutical preparations, proprietary
G. Laboratory supplies	1.7	PPI glass containers (40%) PPI industrial chemicals (60%)
H. Radiology supplies	1.1	PPI photographic supplies
I. Medical/surgical supplies	7.7	CPI non-prescription medical equipment and supplies
J. Repairs and maintenance supplies	0.7	CPI maintenance and repairs, commodities
III. Other		
A. Repairs and maintenance services	0.9	CPI maintenance and repairs, services
B. Contracted laundry and linen	0.9	CPI laundry and dry cleaning other than coin operated (80%) CPI household linens (20%)
C. Malpractice insurance	1.5	New Jersey Health Care Insurance Exchange group rates
D. Utilities	1.3	PPI electricity, industrial power, 500 KW demand, Mid-Atlantic
1. Electricity	0.4	American Gas Association, gas utility industry average price per MBTU
2. Gas	0.8	U. S. Dept. of Energy, residential heating oil price, Mid-Atlantic
3. Oil	0.2	CPI water and sewage maintenance
4. Water and sewage maintenance		
E. Major movable equipment	0.4	Marshall Valuation Service, hospital equipment cost index
1. Beds and nursing equipment	0.2	PPI food products machinery (35%)
2. General services equipment		PPI laundry equipment (20%) PPI vacuum cleaners (15%) PPI metal working machinery and equipment less industrial process furnaces and less abrasive products (30%)
3. Business service equipment	0.3	PPI office and store machines and equipment less coin operated vending equipment (weighted by relative importance)
4. Diagnostic and therapeutic equipment	1.5	PPI commercial furniture (weighted by relative importance)
F. Other services	6.7	Marshall Valuation Service, hospital equipment cost index CPI services less rent and medical care
Total	100.0	

Table 4 (Continued)
New Jersey Hospital Association Input Price Index, Categories of Cost Relative Importance, and Price Variables

- 1/ New Jersey Hospital Association
746-760 Alexander Road CN1
Princeton, New Jersey 08540
- 2/ For general methodology, see John C. Roasman, et. al., An Economic Factor for the Hospitals of New Jersey, Hospital Association of New York State, Inc., December 1977.
- 3/ For 26 acute care hospitals.

which exceed and others which are below the average of the comparison group. It is the composite rate of increase that is relevant. When an individual hospital has a composite rate of input price increase which is beyond the control of efficient management and the increase is significantly higher than a validly constructed average peer group composite increase, a special adjustment may be appropriate.

Selected Issues Pertaining to Base Year Expenditure Weights

1. What data can be used to derive base year expenditure weights?

Typically the starting point is to gather hospital accounting and statistical data for various cost centers. The cost center data is then disaggregated into "natural" expense categories that can be appropriately related to specific prices or wages.

For example, the utilities cost center expenses would first be split into salary expenses and non-salary expenses. Salary expenses would be trended forward by a relevant wage rate. Nonsalary utility expenses can be disaggregated further into electricity, natural gas, fuel oil, water and sewerage, etc. (see Tables 1 and 4). Each of these detailed expense categories can be trended forward with their respective relevant price index (See Berger and Sullivan, 1975; Gort, Hartley, and Pagano, 1976; Harbridge House, Inc., 1978; Rossman, et. al., 1977). Special surveys may be needed to obtain expenditure weights for some categories.

2. How many expense categories are needed to develop a valid and reliable index?

Typically 10 to 50 expense categories are used (see Tables 1, 3 and 4). The number of categories needs to be large enough so that (1) individual expense categories can be related to relevant specific price indexes and (2) significant variations in price changes across inputs can be captured.

On the other hand the number of expense categories should be small enough so that (1) reliable and valid data is available for both the expense weights and the associated price indexes, (2) the composite index is easily understandable by all parties affected (e.g., hospitals, unions, rate-setters, third-party payers, etc.), and (3) the composite index is relatively easy to calculate and quality control can be maintained without administrative burden.

3. How does one determine a good expense category?

Choosing expense categories involves balancing several criteria. Experts, using different implicit or explicit weights for each of the criterion, may devise alternative numbers and types of expenditure categories. Berger and Sullivan (1975) have suggested a number of criteria as helpful in choosing "natural" expense categories.

- a. Availability of relevant price change indicators--each expense category should be related to a relevant and reliable

price change indicator that is updated frequently and is easily accessible (see Tables 1, 3 and 4). For example, food expenses can be related to published Consumer Price Indexes for food at the national or SMSA geographic area. These price indexes are updated monthly or bi-monthly and are available with a short lag after the data is collected.

- b. Consistency with hospital accounting and statistical report definitions and practices--since cost center accounting data is typically too aggregate to relate to specific price change indicators the accounting data has to be disaggregated into more detailed sub-categories. The sub-categories should aggregate to the hospital accounting data totals.
- c. Significance--the expense category should comprise a significant proportion of total hospital expenses and/or the expense category should have price changes associated with it that deviate significantly from the average price change of the composite index.
- d. Homogeneous within categories and heterogeneous among categories--the composition of expense categories should be homogeneous within categories and heterogeneous among categories. Thus one price change indicator can appropriately be associated with each expense category and different price change indicators are needed for the various categories.
- e. Mutually exclusive and exhaustive--the expense categories should be mutually exclusive of each other and exhaustive of all cost components affected by the index.

4. Are some categories of expense typically excluded from input price indexes used for prospective reimbursement?

Yes. Most capital costs and expenses associated with malpractice insurance are typically excluded from the input price index (inflation factor) and are handled as an adjustment to the base rate for individual hospitals.

Capital costs can be broken into four categories: depreciation of buildings and fixed equipment, depreciation of movable equipment, long-term interest expense, and working capital. Selected components of movable equipment costs (see Tables 3 and 4) and working capital are sometimes included in hospital input price indexes used for prospective payment. This is especially likely when individual hospital weights are used rather than peer group or national weights since the individual weights reflect specific circumstances. As far as we can ascertain, depreciation of buildings and fixed equipment and long-term interest rate expenses have not been included in input price indexes used for prospective reimbursement.

Accounting for "price" changes associated with depreciation is difficult from conceptual, statistical, and data collection points of view. Hospitals depreciate buildings, fixed equipment, and movable equipment on an original cost basis. Changes in tax laws and accounting methods can greatly affect such depreciation "costs." Since construction for expanding facilities and for replacement of existing facilities takes place at different rates for different hospitals, each hospital is in a unique situation.

All debt, short-term and long-term, has a specific maturity structure and is contracted at interest rates in effect at the time of incurring such debt. The time-structure of current debt obligations and associated contracted interest rates are unique to each hospital.

Many factors determine the cash required for capital needs. Some of these factors are: (1) whether an existing facility is to be replaced, (2) whether expansion or contraction of existing bed capacity is anticipated, (3) inflation rates for construction and renovation of buildings and for fixed and movable equipment, (4) endowment income, (5) investment income, (6) rental rates for equipment and buildings (7), the extent to which debt verses equity financing is to be used, (8) market interest rates (9) opportunities for below-market interest rates (10) tax laws pertaining to depreciation and interest, and (11) community health planning decisions which may encourage or constrain capital expansion for a particular institution.

Some components of capital costs may be different for proprietary than for voluntary hospitals.

In general modern techniques of capital budgeting and financial management in combination with community-based health planning have been used to attempt to control capital cost increases in the hospital industry.

There is significant controversy concerning the impact of retrospective historical cost reimbursement for depreciation and interest upon the growth of capital investment in the hospital industry (Cleverley, 1979). Some believe the historical cost reimbursement is a significant contributor to the rising cost of hospital care. Others believe that historical cost reimbursement for capital has severely limited the hospital industry's capacity to replace needed facilities in an inflationary economy.¹ In any case price-level depreciation reimbursement (i.e. replacement cost depreciation) can be significantly more costly than historical cost reimbursement and it may provide an incentive for capital expansion in the hospital industry (Cleverley, 1979).

There is an urgent need to develop prospective payment methods for capital and capital-related costs which are cost effective; preserve and/or enhance access to care in underserved areas; recognize effects of inflation on incomes, assets, and replacement costs; and are administratively feasible.

1/ Numerous articles and monographs have been written relevant to capital costs, inflation, and reimbursement policy. See for example American Hospital Association (1977), Arditti (1973), Averch and Johnson (1962), Broyles (1981), Cain and Gilbert (1978), Churchill (1982), Cleverley (1979), Cleverley (1974), Cleverley (1978), Financial Accounting Standards Board (1982), Financial Accounting Standards Board (1979), Friedman and Neumann (1979), Hospital Association of New York State, Inc. (1980), Hospital Association of New York State, Inc. (undated), Hospital Financial Management Association (1980), Long (1976), Nelson, Glenn, and Collins (1980), Russell (1975), Silvers (1975), Young (1982).

Costs associated with professional liability in hospitals are difficult to quantify in both cross-section and time-series data. Hospitals may self-insure, pay on a claims-made basis, or purchase professional liability insurance for a fixed or a changing level of coverage. Experience rating may result in hospitals in the same area paying significantly different rates. As with all insurance premium data, it is not possible to statistically isolate pure price effects from changes in quantity and quality. No national or regional data source currently exists which can precisely quantify the many variations in the costs associated with professional liability in hospitals.

5. Should the weights be derived from data which is national, regional, peer group within a region, or unique to the individual hospital?

It depends upon the purpose of the index, data availability, and preferences of users of the index. It is important to note that a hospital with an inefficient mix of inputs can have a lower percent increase in the weighted average of prices than a hospital with an efficient mix of inputs (Harbridge House, Inc., April 27, 1978). An inefficient mix of inputs is primarily reflected in an excessive base level of expenditures, ^{2/} not in the rate of growth of prices for a fixed market basket of inputs.

^{2/} For a given quantity and quality of output.

Selected Issues Pertaining to Price Indicator Variables

1. What are some sources of national and regional price data for use in hospital input price indexes?

There is a wide variety of public and private sources of price and wage data that can potentially be used in the development of hospital input price indexes (see Technical Note A at end of this paper and Tables 1, 3, and 4). The reliability, validity, relevance, and accessibility of this data varies widely so it is imperative to carefully examine each potential price/wage series for its appropriateness for prospective payment.

2. What are some criteria in choosing wage-price indicator variables?

Choosing appropriate wage-price proxies for each expense category necessarily involves professional judgment concerning the strengths and weaknesses of each proxy variable. Five criteria are used in choosing price proxies: relevance, low sampling variability, timeliness, length of time-series, and external versus internal nature of price proxies.

- a. Relevance. The price variable should be chosen so as to accurately represent price changes for specific goods or services within the expense category. Since hospitals purchase some commodities and services at the wholesale level and others at the retail level, the proxy variable should correspond with the appropriate stage of distribution.

- b. Low sampling variability. If the proxy wage-price variable has a high sampling variability or inexplicable erratic patterns over time, its value is greatly diminished since it is unlikely to accurately reflect price changes occurring in its associated expenditure category. Low sampling variability may conflict with relevance. Typically, the more specific the price variable is defined in terms of type of service, commodity, or geographic area, the higher its sampling variability.
- c. Timeliness, or availability of actual published data. This is especially important when retroactively correcting previously forecasted budgets. For this reason, monthly and quarterly data take priority over annual data.
- d. Length of the historical time-series data. New price-wage series, while appearing useful, may later prove invalid or have high sampling variability.
- e. External verses internal price-wage data. The last criterion relates to whether price-wage variables which are external to the hospital industry are to be used rather than these which are internal to the hospital industry. It is generally accepted that the prices paid for most nonlabor inputs are beyond the control of the individual hospital or the industry as a whole.^{3/}

^{3/} However, efficient buying techniques appear to be associated with lower purchase prices (Aspen Systems Corporation, 1981; U.S. General Accounting Office, January 1980).

It is not so generally accepted that wages and fringe benefits paid to hospital employees are totally beyond the control of individual hospitals and the hospital industry. Due to managerial slack (Feldstein, 1981; Ginsburg, 1978; Joskow, 1981; Salkever, 1979) associated with non-profit economic structure and cost-based reimbursement, some hospitals may not be efficient buyers of labor.^{4/}

Therefore, wage and fringe benefit variables that are external to the hospital industry may be appropriate for prospective payment (for some examples see Tables 3 and 4). The choice for the wage and fringe benefit variables should be consistent with efficient resource allocation within hospitals as well as between hospitals and the rest of the economy. The wage and fringe benefit variables need to be external to the hospital industry, yet reflect basic forces of supply and demand operating on workers of the skill mix levels hired by hospitals. Movements in the wage and fringe benefit variables should be equitable relative to other workers in the economy

^{4/} On the issues of the degree of control hospitals have on wages for their employees and on the influence of managerial slack on wage determination, see Allison (1976) Edelson (1971), Evans (1976), Feldstein (1971), M. Feldstein (1979), Feldstein and Taylor (1977), Hughes et al. (1978), Kidder and Sullivan (forthcoming), McKibbin and Beck (1979), Salkever (1979), Sloan and Steinwald (1980), Taylor (1977), and Zubkoff (1978).

with similar skills and work loads. ^{5/} Since wages and fringe benefits comprise about 60 percent of hospital costs, it is crucial to pay special attention to labor costs. It is important that the incidence of minimum wage increases and the impact of collective bargaining be implicitly or explicitly accounted for by the index in a way that is fair and efficient.

3. Do input price indexes typically use national or regional price indicators?

Some use a combination of national and regional price indicators (see Tables 3 and 4). Others use only national price variables. The purpose of the index, availability of reliable data, preferences of persons developing the index, and the extent to which hospitals purchase inputs in regional or national markets are some of the key determinants of the mix of national and regional price variables used in currently developed indexes.^{6/}

^{5/} For contrasting views relating to the choice of external wage and fringe benefit variables to include in an input price index, see Desien (1980), Freeland, Anderson, and Schendler (1979), Gort et al. (1975), Harbridge House, Inc., (November 1978), Rossman et. al. (1977), and Sloan and Steinwald (1980).

^{6/} For some examples see Berger, and Sullivan (1975), Freeland, Anderson, and Schendler (1979), Freeland, Schendler, and Anderson (1981), Gort et. al. (1975), Gort, Hartley, and Pagano (1976), Harbridge House, Inc., (November 1978), Health Care Financing Administration (Sept. 30, 1981), Phillip (1977), Phillip et. al. (1976), Rossman et. al. (1980), Rossman et. al. (1977).

4. Is it necessary to forecast the hospital input price index in order to set the prospective payments ?

Yes. This can be done at different levels of aggregation and with various degrees of sophistication. The composite index, groups of prices, or individual prices can be forecast. At the simplest level, it is sometimes assumed that each price component will increase at the same rate as it did last year. Retroactive corrections can be made for errors in this simple forecast. Regression analysis, time-series analysis, or panels of experts using judgment can be used to forecast individual prices or groups of prices. ^{7/}

The input prices can be forecast by the organization developing the index or private consultants can be hired. ^{8/} Contact hospital associations, rate-setting agencies, and Blue Cross plans that have operating prospective payment programs to locate private consultants that specialize in forecasting prices that have special relevance for hospital input price indexes.

5. Are retroactive corrections typically made for forecast errors?

Most, but not all programs make corrections for forecast errors.

^{7/} On methods used to forecast input prices see Adams and Narasimhan (1981), Data Resources, Inc. (1980), Desien (1980), Gort et. al. (1975), Gort, Hartley, and Pagano (1976), Harbridge House, Inc. (November 1978), and Rossman, et. al. (1977).

^{8/} A listing of some macroeconomic forecasters is given in Technical Note B.

Conclusion

There is not one best way to construct a hospital input price index. The specific details of the development of an input price index depends upon (1) the purpose for which it is used,^{9/} (2) the quantity and quality of data available for the particular application, (3) the preferences of the parties involved (rate setters, third party payors, providers, etc., and (4) special conditions relevant to the local area.

In general, developing an input price index requires balancing several criteria, some of which may conflict. Experts may legitimately disagree about specific technical details of development but should be able to reach agreement that is within the range of technically acceptable choices. Choices outside this range can be discarded as not in best interest of society as a whole.

^{9/} For example, whether it is used as a screening device for peer groups of hospitals or as a potentially binding constraint for each individual hospital.

TECHNICAL NOTE A
PARTIAL LISTING OF DATA SOURCES FOR WAGES AND PRICES

Note: It is important to verify that each wage or price variable used in a hospital input price index is appropriate for the specific purpose, statistically reliable and valid, and readily accessible on a timely basis to all affected parties.

<u>Publication or Organization</u>	<u>Description of Data</u>
American Hospital Association, "Hospital Indicators," <u>Hospitals</u> , published twice per month.	Average payroll expense per full-time equivalent worker, average employee benefit expense per full- time equivalent worker (monthly data)
American Hospital Association, <u>Hospital Statistics</u> , annual publication.	Average payroll expense per full-time equivalent worker, average employee benefit expense per full- time equivalent worker (annual fiscal year data)
Aspen Hospital Purchasing Price Index Aspen Systems Corporation 1600 Research Boulevard Rockville, MD 20850	Hospital supply prices
<u>Best's Review</u> Property/Casualty Insurance Edition, Oldwick, N.J. 08858	Medical professional lia- bility insurance premiums (hospital and physician combined)
Board of Governors of the Federal Reserve, <u>Federal Reserve Statistical</u> <u>Release</u> , G. 13, "Selected Interest Rates and Bond Prices."	Interest rates
<u>Bureau of Census, Construction</u> <u>Review</u> , U.S. Department of Commerce.	Construction cost indexes
Bureau of Economic Analysis, <u>Survey of Current Business</u> , U.S. Department of Commerce.	Employee benefits (supple- ments to wages and salaries), price indexes, interest rates
Bureau of Labor Statistics, <u>CPI Detailed Report</u> , U.S. Department of Labor.	Detailed consumer prices

<u>Publication or Organization</u>	<u>Description of Data</u>
Bureau of Labor Statistics, <u>Current Wage Developments,</u> U.S. Department of Labor.	Compensation per hour (includes employee benefits), hourly earnings, hourly earnings indexes, employment cost index for wages and salaries and for total com- pensation
Bureau of Labor Statistics, <u>Employment and Earnings, U.S.</u> Department of Labor.	Hourly earnings by industry, includ- ing the hospital industry
Bureau of Labor Statistics, <u>Industry Wage Survey: Hospitals</u> <u>and Nursing Homes, September 1978,</u> Bulletin 2069, U.S. Department of Labor, November 1980.	Occupational wage data in 22 major metropolitan areas (triannual survey)
Bureau of Labor Statistics, <u>Monthly</u> <u>Labor Review, U.S. Department of</u> <u>Labor.</u>	Consumer prices, producer prices, compensation per hour (includes employee benefits), hourly earnings, hourly earnings indexes
Bureau of Labor Statistics, <u>National</u> <u>Survey of Professional, Administrative,</u> <u>Technical, and Clerical Pay, U.S. De-</u> <u>partment of Labor.</u>	Annual salary survey
Bureau of Labor Statistics, <u>Producer</u> <u>Prices and Price Indexes, U.S. De-</u> <u>partment of Labor.</u>	Detailed producer prices
E. H. Boeckh Company 615 East Michigan Street P.O. Box 664 Milwaukee, Wisconsin 53201	Construction cost indexes
F. W. Dodge Division McGraw-Hill Information Systems Co. 1750 K Street, N.W. Suite 1170 Washington, D.C. 20006	Construction cost indexes

Publication or Organization

Description
of Data

Hospital Purchasing, Inc.
14 College Street
Toronto, Ontario
Canada M5G1K2

Hospital supply prices

IMS America Ltd.
Ambler, Pennsylvania 19002

Hospital supply prices

Insurance Services Office
910-17th Street, N.W.
Suite 522
Washington, D.C. 20006

Hospital malpractice
insurance premium
rates

Marshall and Swift
1617 Beverly Boulevard
P.O. Box 26307
Los Angeles, California 90026

Hospital equipment
cost index

TECHNICAL NOTE B
PARTIAL LISTING OF PUBLIC AND PRIVATE MACROECONOMIC ECONOMIC FORECASTERS

Some forecast one or two measures of price inflation such as the Consumer Price Index for all items or the implicit price deflator for the gross national product. Others forecast over 100 specific price variables. Some of the forecasts for a small number of variables are provided free. Others are quite expensive and provide considerable detail. Many private consulting firms provide forecasts tailored to the needs of individual clients.

This partial listing of macroeconomic forecasters is provided as a possible resource for persons or organizations desiring addresses and phone numbers of some of the major forecasting services. Inclusion or exclusion from this list in no way signifies endorsement or lack of endorsement by the Health Care Financing Administration or the Department of Health and Human Services.

Contact hospital associations, rate-setting agencies, and Blue Cross plans that have operating prospective payment programs to locate private consultants that specialize in forecasting prices that have special relevance for hospital input price indexes.

Blue Chip Economic Indicators

Eggert Economic Enterprises

Box 1569

Sedona, Arizona 86336

(602) 282-4882

(summarizes forecasts of approximately forty different forecasters, monthly publication).

Business Forecasts

Federal Reserve Bank of Richmond

Richmond, Virginia 23261

(804) 643-1212

(summarizes forecasts of several different forecasters, published annually in February).

Chase Econometrics

150 Monument Road

Bala Cynwyd, PA 19004

(215) 667-6000

Citibank Economic Forecast Service

399 Park Avenue

New York, New York 10043

(212) 559-6758

The Conference Board

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New York, New York 10022

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Executive Office of the President
Old Executive Office Building
17th and Pennsylvania Ave., N.W.
Washington, D.C. 20500
(202) 395-5034

Data Resources, Inc.
1750 K Street, N.W.
Washington, D.C. 20006
(202) 862-3700

Evans Economics, Inc.
1211 Connecticut Ave., N.W.
Suite 710
Washington, D.C. 20036
(202) 342-0050

Georgia State University
Economic Forecasting Project
University Plaza
Atlanta, Georgia 30303
(404) 658-3282

Manufacturers Hanover Trust
350 Park Avenue
New York, New York 10022
(212) 350-4710

Merrill Lynch Economics, Inc.
One Liberty Plaza
165 Broadway
New York, New York 10080
(212) 637-6200

National Bureau of Economic Research-
American Statistical Association
Quarterly Survey of Economic Forecasts
American Statistical Association
806 15th Street N.W., Suite 640
Washington, D.C. 20005
(202) 393-3253

Townsend-Greenspan and Co., Inc.
One New York Plaza
New York, New York 10004
(212) 943-9536

Wharton Econometric Forecasting
Associates, Inc.
3624 Science Center
Philadelphia, PA 19104
(215) 386-9000

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